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Abstract

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INSTRUCTIONAL OBJECTIVES FOR A JUNIOR COLLEGE COURSE IN ZOOLOGY

Compiled by

Michael R. Capper

ERIC CLEARINGHOUSE FOR JUNIOR COLLEGES
University of California
Los Angeles, California 90024

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JC 690 431

ZOOLOGY OBJECTIVES: SET # 1

UNIT I

The World Around You

"This constitutes the romance of life. At every bend of the road, there are new unfoldings and each new day reveals undiscovered grandeurs. Life holds many surprises."

Perhaps one of the most basic reasons for offering General Zoology is to make the student aware of the processes and wonders of life. "The World Around You" is a look at the dynamic interactions that allow life to be--interactions between the abiotic and biotic world, interactions between the phyla, interactions between species and interactions among species.

OBJECTIVES

Lecture 1

I. **Goal:** The student shall understand the concept of taxonomy and how it relates to biotic diversity.

Objective:

1. In twenty-five words or less the student shall define the animal kingdom as differentiated from the plant kingdom. 90%
2. Given a description of plant classification, the student shall select their proper scientific name and shall give one common example of a plant to be found in this classification. 80%
3. The student shall list three inadequacies in classification and explain why they are so considered. 90%
4. Given the terms phylum, class, family species, genus and order,

the student shall name an animal in the proper order. 80%

Lecture 2

II. Goal: The student shall know the names and differences between the phyla.

Objective:

1. Given a list of phyla, the student shall place them in their order of evolution with complete accuracy. 90%

2. Given four consecutive phyla, the student shall note the major advances of each. He must list at least three advances to be correct. 80%

3. Given a list of common named animals, the student shall match them to their appropriate phyla. 70%

Lecture 3

III. Goal: The student shall understand ecological relationships.

Objective:

1. In ten words or less, the student shall define biomes. Given a list of biomes, he shall give the characteristics of each and one example per biome of an animal that would inhabit it. 80%

2. The student shall match ten ecological terms with their definition with complete accuracy. 90%

3. Outside of class, the student shall write a paper of 250-500 words defining the abiotic and biotic world. He shall explain the interaction of the two. 100%

4. Outside of class, the student shall write a paper descriptive of the effects of O_2, N_2, CO_2, H_2S, and H_2O on the abundance of life. The paper is not to exceed 300-850 words and shall explain the interaction of the atmosphere cycles. Diagrams will be accepted. 90%

5. Given a food chain, the student shall determine the energy content and he shall predict the outlook if one of the steps is removed. 70%

6. The student shall list four properties of water and define the significance of each. 90%

7. In outline form, the student shall list the relationships between symbiotic and non symbiotic animals. He shall define three terms and give an example of each to be correct. 85%

Lecture 4

IV. Goal: The student shall understand inter and intra specific relationships.

Objective: 1. Shown five slides, the student shall identify at least four of them by placing them in their proper mimicry classification. 90%

2. The student shall differentiate between interspecific and intraspecific competition, by matching a problem to the type of group it affects. 70%

3. In a paper written outside of class, the student shall explain how polymorphism, metagenis, and metamorphsis help eliviate the problem of competition. The paper, 250-500 words, should contain a definition and example of each term. 100%

Lecture 5

V. Goal: The student shall understand how social organization affects species continium.

Objective: 1. Given the basic pattern of bee communication, the student shall devise his own means of how a bee might communicate color. He shall set up (on paper) an experiment to test his theory. Any hypothesis backed by a workable experiment shall be accepted. 80%

2. The student shall explain in 500 words or less, how the evolution of the ring dove has changed its courting behavior. 60%

3. Given a hierarchy, the student shall predict the mating order of the animals by placing them in rank order. 90%

4. Given the social structure of a termite, the student shall define each caste and compare them to the bee caste. 85%

5. After hearing a recording of a "Life in the day of a chicken", the student shall give the name for each type of sound presented. 60%

Lecture 6 REVIEW SESSION

Lecture 7 **EXAM**

UNIT II

Molecular Life

An old mathematical axiom states that the "whole is equal to the sum of its parts." And, so it is in the biological world; a chair is made of atoms, a person is a conglomeration of molecules held together by even more molecules. As science advances, it becomes more and more apparent that everything can be explained on the molecular basis--for here is where life's processes begin.

Objectives

Lecture 8

I. Goal: The student shall understand the formula for various biochemical compounds and how they bind together.

Objective:

1. In lab, the student shall identify different sugar compounds by their reaction with the Biuret Test. He must hand in a written copy of his results and their explanation--not to exceed two pages. 80%

2. The student shall draw the structure for a lipid, a phospholipid, alcohol, ketone, aldehyde, pyrimidine, purine with complete accuracy. 60%

3. Given a structure, the student shall give its proper chemical name. Ten structures will be given. Nine must be correct. 80%

4. The student shall list at least four uses for carbohydrates as a structural component of living organisms. 80%

UNIT III

The Cell

The basis of all biological activities is the cell and how its components interact. As a fundamental unit, the cell's function must be realized in order to fully understand why genetics and development can occur. Each part of the cell has a definite role in maintaining and multiplying systems. Knowledge of the cell enables comprehension of biological activities.

Objectives

Lecture 9

I. Goal: The student shall recognize the types of cells and their components.

Objective:

1. Given a diagram of a cell, the student shall name all structures labelled, and define their function in ten words or less, with complete accuracy. 90%

Objective

2. The student shall compare and contrast the plant and animal cell by listing all the parts common to each, and all the parts that differ. 80%

3. The student shall, outside of class, write a paper 50-200 words, describing the advances that the electron microscope has made in the area of the plasma membrane, endoplasmic reticulum, golgi apparatus, and mitochrondria. 80%

4. In lab, the student shall stain onion cells and plant cells and list the differences observed as to structure and uptake of stain. 90%

Lecture 10

II. Goal: The student shall understand mitosis and meiosis.

Objective:

1. The students shall define mitosis and its stages and meiosis and its stages and note the difference in each stage. 70%

2. In diagram form, the student shall compare and contrast mitosis and meiosis. 80%

Lecture 11

III. Goal: The student shall understand the cell and its environment.

Objective:

1. The student shall define hypotonicity, hypertonicity, and osmosis, and give an example of each. 90%

2. Given experimental data on hemoloysis the student shall explain which process of osmosis is working. 80%

3. The student shall define active and passive transport and give an example of each in terms of biological function. 90%

4. Given an animal (fish and desert mammal) the student shall explain how each has adapted to its water environment. 80%

Lecture 12

IV. Goal: The student shall understand cellular metabolism.

Objective:

1. In a descriptive fashion, without listing the compounds formed, the student, outside of class, in a paper 350-800 words, shall explain how ATP is formed and how the electron chain forms H_2O. 80%

2. The student shall match four terms of the metabolic pathway with their definition, with complete accuracy. 90%

Lecture 13 REVIEW SESSION

Lecture 14. **EXAM**

UNIT IV

Genetics and the Continuation of Species

In 1959, Watson and Crick gave to the world the first model of DNA. Until this time, the concept of genes and protein formation was in the dark. With this new discovery came a clearer picture of Mendel's Laws, hereditary and DNA's functions such as protein formation and hormonal control. By studying genetics, one can understand how organisms evolved and will continue to evolve.

OBJECTIVES

Lecture-15

I. Goal: The student will understand the concept of a gene and the structure of DNA.

Objective:

1. The student shall define the components and structure of DNA by first giving their structure and then explalining how each bonds to the next. 80%
2. Given three experiments with DNA, the student shall catagorize each as to whether they are examples of transformation or transduction. 70%
3. Given ten genetic terms, the student shall match each with its definition with complete accuracy. 80%
4. Given twelve genetic terms, the student shall define each and give thier evolutionary significance. 80%

5. The student shall define mutation and list at least three ways that it is accomplished. 80%

6. The student shall list three types of allels and explain which is most likely to cause evolutionary changes. 80%

7. The student shall state Mendel's two laws and give an example of each. 100%

Lecture 16

II. Goal: The student will understand how populations change.

Objective 1. Using a specific example of a heterzygous gene, the student shall show how it has effected evolution. 80%

2. The student will define the Hardy Weinberg equation in a mathematical form. He shall then explain what each term represents. 80%

3. Given a population with certain gene frequencies, the student shall predict the future frequency of that gene. 60%

4. The student shall define genetic drift and give an example of its evolutionary significance. 80%

Lecture 17

III. Goal: The student shall understand evolutionary objectives.

Objective: 1. Given a listrof genetic terms, the student will define each in its evolutionary context with complete accuracy.

2. Given a list of twenty animals, the student will identify with complete accuracy the period in which they evolved.

3. Outside of class, the student will write a nine hundred word paper

comparing and contrasting the features of any five evolutionary periods. The paper must include animals evolving and geographical and weather conditions. 80%

4. In a written essay, not to exceed 500 words, the student shall describe at least five factors of Darwin's Theory of Natural Selection. The essay must include a specific example.

5. Outside of class, the student will write a 300-800 word essay describing the shift in bone sturcture from the acquatic to the terrestial animal. The essay must include specific examples. 80%

Lecture 18

Iv. Goal: The student shall understand how DNA regulates protein formation and hormones.

Objectives: 1. The student shall define the three types of RNA, giving their structure and their function in protein synthesis. 90%

2. The student shall compare DNA and RNA as to structure and function. 100%

3. The student shall explain how Beadle and Tatum arrived at their "one gene one enzyme" theory and explain it. 80%

4. The student shall define operon and repressor in conjunction with protein formation. 90%

5. Given a mutation in the DNA strand, the student shall predict how the protein will be read by the ribosome. 80%

6. Outside of class, the student shall write a paper 300-500 words explaining how DNA controls a hormone. Paper to include a definition of hormone and the

mechanism by which it is formed. 90%

UNIT V

Cell Growth

Higher organisms are thought to be more complex because there must be an interrelationship between the cells. Efficiency is maintained because cells differentiate into tissues which combine to form organs, which combine to form systems. The cell, therefore, must grow by mitosis and develop into a multicellular animal. This process can be called embryology, or the study of how a single cell develops into a multicellular organism.

Objectives

Lecture 19

I. Goal: The student shall understand the concept of development.

Objective:

1. The student shall define ten embryonic terms with complete accuracy. 90%
2. Given three animals, the student shall diagram their development from fertilization to gastrulation and explain each step. He shall include the differences in the types of cleavage. 70%
3. The student shall give the evolutionary significance of chromosome puffs in thirty words or less. 90%
4. Given a list of twelve animals,

the student shall place them in the category of protosome or deutrostome. 90%

5. Given three types of tissue, the student shall give their derivation and their destiny. To be done in outline form. 80%

6. In an oral report not to exceed five minutes, the student shall explain an experiment which shows how the cytoplasm affects development. 100%

7. The student shall describe an experiment using Acetabularia and give its significance in development. He shall list at least three reasons why this organism is good research material. 80%

8. The student shall trace the day by day development of the notochord from Hensen's node to full development. 80%

9. The student shall define and give an example of induction. 90%

Lecture 20

I. Goal: The student shall recognize different types of tissue.

Objective:

1. Given a picture of bone formation, the student shall name the labelled parts, define them, and tell their order of appearance. 80%

2. In fifty words or less, the student shall differentiate germinal and somatic tissue. 80%

3. The student shall describe the formation of skin and shall explain why skin doesn't fall off the body. 70%

Lecture 21 REVIEW SESSION

Lecture 22 EXAM

UNIT VI

Life on the System Level

Cells interact through systems. By this means, the animal can eat, breathe, excrete and circulate nutrients. Through systems, the animal reproduces, and responds to outside stimulus. Each system is a separate unit, yet each integrates with the next to form the complex whole animal.

Objectives

Lecture 23

I. Goal: The student shall understand respiration.

Objective:

1. Given a diagram of the respiratory apparatus, the student shall name the labelled parts with complete accuracy. 80%
2. The student shall compare and constrast in a paper written outside of class, 200-500 words, the difference between a mammalian and insect respiratory system. Paper to include type of pigments, circulation of gases, and breathing apparatus. 70%
3. The student shall list at least three ways that O_2 is carried throughout the body. 80%
4. The student shall define four types of anoxia and how they are formed. 80%

Lecture 24

II. Goal: The student shall understand circulation.

Objective:

1. The student shall trace the development of the heart from the earthworm to mammals. 70%

2. The student shall, in 100 words or less give the significance of the lymph system. 80%

3. The student shall define the make up of mammalian blood--its shape, O_2 carrying ability and plasma content. 80%

4. Given a list of animals, the student shall explain whether their circulation is closed or open and how this affects their circulation. 70%

Lecture 25

III. Goal: The student shall understand excretion.

Objective:

1. The student shall explain the main function of Henle's Loop. 90%

2. Given a hypothetical animal the student shall devise the best excretory system for it. 60%

3. The student shall trace the development of the kidney from the flame cell, to the kidney of a mammal. To be written outside of class in a paper 300-500 words. The paper shall include the significance of each advance in development. 70%

4. The student shall give the major reason for having an excretory system--other than the elimination of wastes. 60%

5. The student shall list and define the three steps in urine formation. 90%

6. Given three animals, (fish, desert rat and man) the student shall discuss in 300 words or less how each has solved its water

Lecture 26

IV. Goal: The student shall understand digestion.

Objective:

1. The student shall describe in ten words or less, the digestive tract of a parasite. 100%

2. The student shall give three advances of a complete digestive tract. 90%

3. Given a list of enzymes, the student will note where they are found, the substrate upon which they work, and the products they form. 80%

4. The student shall diagram the digestive tract of man and a cow, and give the main reason for their difference. 90%

Lecture 27

V. Goal: The student shall understand the skeletal and muscle systems.

Objective:

1. The student shall compare and contrast exoskeleton and endoskeleton and give the advantages of each. 80%

2. The student shall list three pairs of antagonistic muscles and tell which type of muscle they are. (hypobranchial, skeletal, voluntary, etc.) 80%

3. The student shall explain why wheels have not evolved as a means of locomotion. 100%

Lecture 28

VI. Goal: The student shall understand the nervous system.

Objective:

1. Given a list of ten words, the student shall match them with their definition. 90%

2. Given eight mammalian nerves, the student shall identify seven by telling their function. 90%

3. The student shall describe cephalization and then trace its development from the worm to man. 80%

4. The student shall list five reasons for having a nervous system. 90%

5. The student, when given the five divisions of the mammalian brain will define the function of each. 90%

6. The student shall differentiate between a nerve and nerve fiber. He shall sketch a picture of each and label all parts. 80%

7. The student shall define the pathway of an impulse when a person touches a hot stove (arc (from stimulus to movement). 90%

8. The student shall diagram and explain the difference and significance of a myleniated and nonmyleniated fiber. 90%

9. Given a diagram of a nerve impulse, the student shall label all parts. He shall explain each part, including the exchange of ions. He shall define the path from the action potential to the synapse. 70%

10. The student shall define a neurohormone and give an example and function of two. 90%

11. The student shall define sympathetic and parasympathetic and give the significance of each. 100%

Lecture 29

VII. Goal: The student shall understand the concept of receptors.

Objective: 1. The student shall differentiate between a sense organ and a receptor in thirty words or less. 100%

2. The student shall draw the ear (outer, inner, and middle) and explain how a person hears. 80%

3. The student shall list two functions of the receptors of the ears. 100%

4. The student shall list five types of receptors in accordance with their external stimulation. 80%

5. The student shall draw the eye of an insect and the eye of a human. He shall name all parts, define their function and compare the type of vision connected with each eye. 80%

6. Given a nocturnal and diurnal animal, the student shall explain the difference of eye structure and the type of receptors present in each. 90%

7. The student shall name two animals whose behavior depends entirely on their virual cycles. 80%

Lecture 30

VIII. Goal: The student shall understand hormones.

Objective: 1. Given five hormones, the student shall match them with their functions with complete accuracy. 90%

2. The student shall list two types of feedback and explain how they relate to the endocrine system. 80%

3. The student shall diagram the pituitary-gonad hormones. By use of arrows, he shall indicate area of action and the feedback system. 70%

Lecture 31

IX. Goal: The student shall understand reproduction and parental care.

Objective: 1. Given the terms sexual and asexual reproduction and parthenogenesis, the student shall define each, give two examples of each and give

the significance of each. 90%

2. The student shall give three advances of the reptile over the amphibian in regards to reproduction. 80%

3. The student shall compare internal and external fertilization and shall give four reasons for the evolution of the former. 80%

4. Given a list of five animals, the student shall give the type of ovary structure found in each. 80%

5. Given a set of hypothetical environmental conditions, the student shall devise a mating-breeding cycle that would best benefit the birth of the young. 70%

6. The student shall define three methods of nourishing their young and give an example of each. 80%

7. The student shall give three examples of pre-natal care. 100%

8. The student shall give two examples of post natal care. 100%

9. In a paper written outside of of class, the student shall describe what he thinks is the best method for reproduction and parental care. Any answer that is supported by facts will be acceptable. Paper not to exceed 500 words. 100%

Lecture 32 REVIEW SESSION

Lecture 33 <u>EXAM</u>

Laboratory Sessions

The lab will consist of performing the experiment and handing in lab reports explaining results and conclusions. Labs will correspond as nearly as possible to the lecture material for that week.

UNIT I

The World Around You

Lab I

I. Goal: The student shall understand taxonomy.

Objective:
1. Given twelve fairly familiar animals, the student shall note the characteristics which place it in its phylum. 100%
2. Given two unknowns, the student shall classify it according to its appropriate phyla and explain why it was placed there. 90%

II. Goal: The student shall understand the microscope.

Objective:
1. Given a diagram of the microscope, the student shall label and name all parts. 100%
2. The student shall focus on a piece of hair at low and high power and have the instructor check it. 100%

Lab 2

I. Goal: The student shall understand the amount of life in a sample of pond water.

Objective: 1. Each student shall bring in a sample of pond water and analyze the amount and types of animal life present. 100%

Lab 3

I. **Goal:** The student shall actively observe animal relationships.

Objective: 1. On a field trip to the zoo, the student shall observe four animals (½ hour for each) and then he shall choose one to report his observations in a five minute talk in lab. 100%

UNIT II

Molecular Life

Lab 4

I. **Goal:** The student shall understand the chemical composition of protoplasm.

Objective: 1. Given reagents for identifying compounds, the student shall note the reaction for protein, fats and carbohydrates. 100%

2. Given an unknown, the student shall identify it by means of its chemical reaction. 90%

UNIT III

The Cell

Lab 5

I. **Goal:** The student shall understand cells and protoplasm and their relation to the environment.

Objective: 1. The student shall view the movement of an amoeba through a microscope and diagram the movement of protoplasm. 100%

2. The student shall study samples acquatic, terrestrial and aerial life, and shall compare their characteristics which define them. 100%

3. The student shall stain onion cells and animal cells and note their similarities and differences. 100%

Lab 6

Goal I. **Goal:** The student shall understand mitosis.

Objective: 1. The student shall study and draw slides of mitosis. He shall label each step and explain what is happening. 100%

UNIT IV

Genetics

Lab 7

I. **Goal:** The student shall understand chromosome and genetics.

Objective: 1. Given a procedure for staining chromosomes of Drosphophilla, the student shall stain them and turn in his slide for grading (to be based on how well the preparation is made). 70%

2. The student shall survey twenty five students for various genetic traits. A composite of the class shall be made and the students shall determine the gene frequency of the "population" by use of the Hardy Weinberg Formula. 90%

UNIT V

UNIT V

Cell Growth

Lab 8

I. Goal: The student shall understand differentiated tissues.

Objective: 1. Given slides of types of tissue, the student shall draw each and explain their function. 100%

UNIT VI

Life on the System Level

Lab 9

I. Goal: The student shall understand digestion.

Objective: 1. Given a beef homogenate, the student shall note the amount of enzyme action under various conditions. 100%

2. Given pepsin and ptyalin, the student shall assay for the products formed. He shall define the process that is occurring in each. 100%

Lab 10

I. Goal: The student shall understand respiration.

Objective: 1. The student shall compare the amount of respiration under aerobic and anaerobic conditions. This shall be done in plants and rats. 100%

Lab 11

I. Goal: The student shall understand irritability and response.

Objective: 1. Given various stimulus situations,

the student shall note how each
is responded to. This experiment
shall be performed on lab partners. 100%

ZOOLOGY OBJECTIVES: SET # 2

Unit I. The Cell as the Basis of Life.

A. Goals.

1. The student will be aware of the history of biology.
2. The student will understand the scientific method and the value of this approach.
3. The student will analyze structure and function on the cellular level and the dependence of function on structure.
4. The student will understand life processes at the cellular level.
5. The student will learn to use the compound and dissecting microscopes as a tool in the study of zoology.

B. Objectives.

1. *The student will match a list of names with the the appropriate contribution to biology and state in 25 words or less why this contribution was so outstanding. **60

2***Utilizing the scientific method, the student will state a problem, show the steps involved in the process as relating to the problem, and indicate the conclusions which might be drawn. 80

3. *The student will design an experiment to prove that photosynthesis utilizes oxygen and produces carbon dioxide, listing the procedures involved and showing how the hypothesis might be proved. 70

4***In an essay of 350 to 500 words, the student will discuss the origin of life relating the various theories, citing the justification for and the inconsistencies in the theories, and will present a plausible theory with its validation. 100

5. *The student will list the properties of life, indicating whether it is generally true of plants and/or animals. 70

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* Under standard classroom testing conditions.
** Criterion level expected.
*** Outside of class, using any standard reference.

6. *Given diagrams of various molecules, the student will match them to the correct item. 80

7. *Given a list of statements, the student will label those that pertain to organic compounds with an O and those that pertain to inorganic compounds with an I. 70

8. *Given a list of statements, the student will indicate where the terms Carbohydrate, Lipid, Protein, or Nucleic acid apply. 60

9. *Given a number of choices, the student will identify those that are properties of enzymes. 80

10. *The student will list the steps involved in protein synthesis. 80

11. *The student will use the terms m-RNA, t-RNA, ribosome, and amino acid to describe a mechanism by which DNA can code for protein structure. 70

12. *In 50-100 words, the student will define anabolism and catabolism and show by example how the two are related. 70

13. *Given a series of statements, the student will indicate which of the following processes would apply: metabolism, energy production, glycolysis, Kreb's cycle. 60

14. *Given a diagram of a cell, the student will label the cell parts and assign a function to each. 80

15. *The student will match a list of structural and functional properties with a list of cell or tissue types. 80

16. *In a series of multiple choice questions, the student will select the stage of cell division that correctly applies. 60

17. *Given a list of terms (hypertonic, osmosis, etc.) the student will match them to a list of physiologic conditions. 70

18. *Given a set of statements on life processes, in which a certain phrase or word might be incorrect, the student will identify and correct the incorrect element.. 60

19. *Given a list of physiological terms, the student will match each with the correct definition. 80

20. The student will prepare drawings as indicated in laboratory studies of microscopic or live material. 100

Unit II. Classification: Survey of the Phyla.

A. Goals.

1. The student will develop an awareness of the advantages and disadvantages of a taxonomic classification.
2. The student will demonstrate an understanding of the characteristics of structure and the life processes of the Phyla Protista, Porifera, Coelenterata, Platyhelminthes, and Aschelminthes and be able to compare the differences between them and discuss the significance of these differences.
3. The student will understand the aspects of parasitology and the effects of such a relationship.

B. Objectives.

1. *The student will list the seven divisions of taxonomic classification in descending order and illustrate each with an example. 70
2. *The student will discuss the present classification system, listing the advantages and disadvantages, and present an alternative system in 100-150 words. 100
3. *Given a list of characteristics, the student will match each to the phyla in which it is found. 70
4. *Given a list of larval or embryonic forms, the student will associate each with the correct phyla and rearrange the list in order of increasing complexity. 60
5. *Given a series of basic body plans, the student shall identify the given types of symmetry and shall show the required planes of division by drawing single lines through the diagram. 80
6. *The student will discuss increasing orders of complexity, giving examples of organisms in which found, with reference to tissues, germ layers, and digestive, excretory, circulatory, reproductive, and nervous systems. 70

Unit III. Survey of the Phyla continued.

A. Goals.

1. The student will demonstrate an understanding of the characteristics of structure and the life processes of the Phyla Annelida, Arthropoda, Mollusca, Echinodermata, Hemichordata, and Chordata. He will be able to compare them and discuss the significance of the differences between them.

2. The student will be aware of different ontologic forms.

B. Objectives.

1. *The student list the phyla, state the type of symmetry, and describe how this relates to the habits of the organism. 70

2. *The student will define homology and analogy, giving three examples of each from different animal phyla. 60

3. same as Objective 3, Unit II.

4. same as Objective 4, Unit II.

5. *Given a series of statements, the student will apply the correct term from the following list: arthropod exoskeleton, annelid cuticle, mollusc shell, echinoderm endoskeleton. 70

6. *The student will match a list of insects with a list of appropriate statements. 70

7. *The student will compare the appendages of a specific crustacean and arachnid in a short paragraph, naming the number, type, and function of each group. The student will suggest how the various adaptations may have arisen. 60

8. *Given a list of terms, the student will match them to a list of statements. (eg. ectoderm, mesoderm, endoderm, mesoglia.) 70

7. *Given the terms rheosensors, chemosensors, photosensors, geosensors, and thygosensors, the student will give an example of any animal where each is found and will state how their presence relates to the life habits of that particular animal. 70

8. *In 100 words of less, the student will discuss how a tropism influences the life of an animal. Using the example of a change in the phototropic response in the amoeba the student will relate this to the habitat, nutrition, respiration and reproduction. 80

9. *Given a list of fill-in statements, the student will supply the type of response (eg. positive phototropism, negative geotaxis) that the organism is making. 80

10. *The student will diagram the life cycle of Obelia, giving the name of each stage and its description (i.e. size, location, motility, shape). 50

11. * The student will diagram the reproductive cycles of organisms belonging to three different phyla. 50

12. *The student will discuss in less that 100 words, sexual and asexual reproduction. Points to be included are two essential differences, two methods of each, and under what conditions asexual reproduction is likely to be found. 70

13. *The student will answer a list of multiple choice questions on parasite-host interrelationships. 70

14. *The student will diagram the life cycles of three parasites, one from each of the following phyla; Protozoa, Platyhelminthes, Aschelminthes. Include the name of each stage, the host or habitat found, where reproduction occurs, and the effect on the host. 50

Unit IV. Principles of Ecology and Genetics.

A. Goals.

1. The student will understand the principles of inheritance; the mechanisms, the analysis, the impact, and the contributions of such knowledge.
2. The student will develop an awareness of the aspects of the interrelationships of life and its environment and in addition, the interrelationships between individuals, between species, and between populations.

B. Objectives.

1. *The student will define a list of words. (eg. locus, genotype, phenotype). 60
2. *Given a list of words, (eg. diplotene, zygotene, metaphase) the student will match each to a series of statements. 60
3. *The student will diagram a cross between a wild type(CC) and an albino (cc) rat and will indicate the proportions of each phenotype found in the F_1 and F_2 generations. 75
4. *The student will answer a series of multiple choice questions on simple problems of monohybrid and dihybrid crosses. 70
5. *The student will define linkage and crossover, and will give four examples of how such studies could be used to benefit mankind. 60
6. *The student will explain in 50-75 words how the current concept of DNA makes possible the transfer of genetic information. 70
7. ***The student will prepare a 350-500 word essay on the evolutionary theory. Include arguments for and against, the validity of the arguments, and comments on why the issue is controversial today. 100
8. *The student will answer a series of multiple choice questions on mimicry, warning coloration, and other adaptive mechanisms. 70

9. *Given a list of true-false statements, the student will indicate whether true or false, underline the incorrect portion, and supply words needed to make the statement correct. These questions will deal with the physical environment. 60

10. *The student will construct an example of a food chain, listing the successive types of organisms in the chain and the food or energy source utilized by each. 60

11. *Given an example of a pyramid of numbers, the student will answer multiple choice questions on the inferences to be made from this example. 70

12. *Given a list of terms (primitive, advanced, specialized, generalized) the student will match the terms to a series of statements. 60

13. *Given a list of terms, (symbiosis, commensalism, mutualism, parasitism) the student will match the terms to a series of statements. 70

14. *Given a description of a habitat, the student will describe a hypothetical animal which might inhabit it. Description will include size, food-gathering mechanism, means of respiration, reproduction, motility, and type of embryonic development. Do this in less than 100 words or in outline form. 80

15. *Given a situation with a geographic distribution of fauna, topographical features, climatic characteristics, and a point source of origin, the student will list the steps by which such a distribution might have occurred in 100-150 words. Include possible geographical changes, climatic changes, and means of transport. 60

16. **The student will select, analyze, and explain a natural situation in which a species of animal is affected in number, diversity of variation, and area of habitation (a) during periods when the environment is especially favorable and (b) during periods when the environment is especially unfavorable. This will be based on Darwin's theory of natural selection and must include an alternative explanation. It will be 250-500 words in length. 70

17. In a classroom discussion, the instructor will raise topics such as air and water pollution, natural selection, and conservation and will ask for pro or con comments from the students. 100

9. *The student will list six adaptations of the Class Insecta which have contributed to their success as a group and will state how each has contributed. 80

10. *Given a list of organisms, the student will mark the deuterostomes with a D, and the protostomes with a P. The student will list the significant features of the two conditions. 60

11. *The student will list four reasons why the Echinodermata is considered significant in the evolution of the vertebrates and will discuss why these reasons are considered significant in 50-100 words. 60

12. In a classroom discussion on evolution of vertebrates through the lower phyla the instructor will give different theories. The students are expected to criticize the theories, indicate where evidence is lacking, or where conclusions are unjustified. 100

13. *The student shall list the three unique characteristics of the Phylum Chordata. 100

14. *The student will give three different visual mechanisms, an animal example of each, and tell how each relates to the life habits of the animal. 70

15. same as Objective 11, Unit II.